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Evaluation of the CRACK approach for the control of drench resistance in sheep worms

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Helen Chapman and Jon Dunsmore, School of Veterinary Studies, Murdoch University

The Department of Agriculture launched the CRACK approach to worm control in September 1985 in response to the finding that anthelmintic (drench) resistant worms were present on 68 per cent of a random selection of Western Australian sheep farms (Edwards et al. 1986b).

The high cost of internal parasites in terms of lost production and drench costs, together with the high prevalence of resistant worms on farms, confirmed that changes were needed to existing parasite control measures in sheep.

Changes suggested by Edwards et al. (1986c) were:

• Test sheep worms for drench resistance. Even if no resistance is found, the frequency of drenching should be reduced because excessive drenching is a major cause of resistance.

• Use narrow-spectrum drenches to control barber’s pole worm (Haemonchus contortus). Continue to use the broad-spectrum drench already in use to control other worms. The dependence on drenches should be reduced through grazing management to lower the rate of larval infection from pasture.

• If resistance is found, use an alternative drench group and monitor the presence of worms.

The Department of Agriculture launched the CRACK approach as part of its extension campaign to control sheep worms and to avoid drench resistance.

About CRACK
CRACK is a mnemonic for:

C - Check your sheep for drench resistance.

R - Reduce drenching frequency to the minimum compatible with production.

A - Avoid using a broad-spectrum drench when a narrow-spectrum one will do; i.e. do not use a broad-spectrum drench when treating sheep for barber’s pole worm only.

C - Check the dose to avoid under-dosing.

K - Keep resistant worms off your farm.
The CRACK campaign involved private veterinarians and consultants in addition to Department of Agriculture personnel. All sheep farmers in the agricultural area were sent information on the CRACK approach. Car bumper stickers, Department of Agriculture Farmnotes and Agricultural Memos, articles in newspapers, newsletters, radio interviews, television segments, video tapes, field days and seminars were also used to promote the campaign. Extension activities were planned by a committee with regional representation. Most activity was in late winter and spring to coincide with the best time for testing for resistance.

The CRACK campaign has now been running for three years. In 1988, Murdoch University researchers surveyed farmers to determine their knowledge of and attitudes to the CRACK programme and to ascertain the level of adoption of the recommended strategies.

Survey methods

Farms from shires in the agricultural area were selected from the Agriculture Protection Board property file and were included in the survey if they were more than 200 ha in area and had more than 500 sheep. Farms were selected at random from each shire. The number of farmers selected for interview in each shire was in proportion to the number of farms with more than 500 sheep in the shire.

Telephone interviews with the 300 farmers were conducted between January and April 1988. Farmers were asked questions relating to their knowledge of and attitude to the CRACK approach, their use of drenches, and worm control programmes used on their farms.

Interviewers were trained in the use of the questionnaire and provided with written instructions. The questionnaire was tested with several farmers before the survey started.

Some of the questions on internal parasite control programmes and use of drenches were similar to those asked in previous surveys (Edwards et al. 1986a, Edwards et al. 1986b). This enabled an assessment of whether or not the CRACK programme had been successful in altering farmers' approaches to the control of internal parasites in sheep.

Results and discussion

Awareness of the name CRACK was low and no farmer knew what all of the letters stood for. The level of knowledge concerning the main principles of the CRACK approach is summarized here.

C - Check your sheep for drench resistance

Thirteen per cent of the farmers surveyed had tested their sheep for resistance during the past three years. The rate of adoption of testing for resistance was highest (24 per cent) on high rainfall farms, followed by medium rainfall (15 per cent) and low rainfall farms (3 per cent). This level of acceptance was higher than expected. Ninety-four per cent of farmers who tested their sheep were happy with the results; and 88 per cent would be likely to have another test.

Only 2.5 per cent of farmers gave cost as a reason for not testing their sheep. (More than three-quarters of the farmers did not know what the test cost.) The main reason given for not testing was "no problem with resistance."

R - Reduce drenching frequency to the minimum compatible with production

Most farmers knew that increasing the number of drenches increased the rate of development of resistance (82 per cent compared with 66 per cent in the previous survey of Edwards et al. 1986b).

Worm egg counts to assess the status of internal parasites in sheep have been recommended as a means of determining whether additional drenches are needed. This technique had a low acceptance rate. Only 13 per cent of farmers had used worm egg counts to help them decide whether or not to drench sheep. As with resistance testing, the main reason given for not using worm egg counts was "no worm problem."

A - Avoid using a broad-spectrum drench when a narrow-spectrum one will do

Seventy per cent of farmers understood the concept of drench groups - white or clear drenches. However 83 per cent did not know that a narrow-spectrum drench for example, closantel (Seponver®, Smith Kline), should be used to control barber's pole worm when other worms were absent. In the high rainfall zone where Haemonchus contortus is often a problem, only 39 per cent of farmers gave the correct answer.
Table 2. Action taken by farmers to prevent the introduction of resistant worms to their properties

<table>
<thead>
<tr>
<th>Action taken</th>
<th>% of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drench introduced sheep</td>
<td>64.2</td>
</tr>
<tr>
<td>Isolate introduced sheep</td>
<td>10.6</td>
</tr>
<tr>
<td>Test introduced sheep</td>
<td>7.9</td>
</tr>
<tr>
<td>Drench introduced sheep with a double dose of both benzimidazole and levamisole group of drenches</td>
<td>3.3</td>
</tr>
<tr>
<td>Other</td>
<td>13.9</td>
</tr>
</tbody>
</table>

Drenches come in various colours and consistencies: (from left) a "clear" drench group, a "white" drench, Seponver® and Ivomec®.

Seventy per cent of the farmers surveyed knew that sheep should be dosed on the basis of the heaviest sheep in the mob, whereas in the 1981-1983 survey of Edwards et al. (1986c) only 28 per cent of farmers would have estimated the dose of drench to be given by this method (Table 1).

Fifty-seven per cent of farmers had weighed sheep before drenching at some time. Electronic or digital scales (28 per cent of farmers surveyed) and wool scales (27 per cent) were used most commonly. Other types of scales used included bathroom scales (13 per cent), clock-face scales (12 per cent) and spring balance scales (6 per cent).

Eighty per cent of farmers had checked the accuracy of the drench gun by using a measuring cylinder or other domestic measuring device. Ninety-one per cent of farmers had taken apart and cleaned the drench gun. Only 4 per cent of farmers had used disposable drench guns.

C - Check the dose to avoid under-dosing
The CRACK approach emphasised that dosing to the weight of the heaviest sheep in the mob was most important in preventing the development of drench resistance. Competitions for estimating sheep body weights and testing drenching guns for accuracy have been popular field day topics (Besier and Hopkins, 1988).

Table 3. People or organizations from whom information was obtained on worm control and the CRACK approach

<table>
<thead>
<tr>
<th>Person/organization asked for advice</th>
<th>Worm control</th>
<th>CRACK approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Agriculture</td>
<td>59.0</td>
<td>58.4</td>
</tr>
<tr>
<td>Private veterinarian</td>
<td>15.2</td>
<td>23.4</td>
</tr>
<tr>
<td>Veterinary/agricultural consultant</td>
<td>5.3</td>
<td>2.6</td>
</tr>
<tr>
<td>Stock firm</td>
<td>8.4</td>
<td>2.6</td>
</tr>
<tr>
<td>Drug company representative</td>
<td>4.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Contractor</td>
<td>0.3</td>
<td>0</td>
</tr>
<tr>
<td>Neighbour/friend</td>
<td>2.8</td>
<td>5.2</td>
</tr>
<tr>
<td>Other</td>
<td>4.8</td>
<td>5.2</td>
</tr>
<tr>
<td>Don't know</td>
<td>0.6</td>
<td>0</td>
</tr>
</tbody>
</table>

* Up to three responses were accepted

Seventy-two per cent of farmers had introduced sheep during the past two years and 58 per cent had taken action to prevent the entry of resistant worms to their farms. Table 2 shows the action they had taken. In most cases, the action taken would have been ineffective in keeping resistant worms off the farm.

Twenty per cent of farmers intended to use Ivermectin (Ivomec® M.S.D.AgVet) for sheep when it became available and many (58 per cent) intended to use it for drenching introduced sheep.

Five per cent of the farmers had used the cattle drench Avomec® M.S.D.AgVet for sheep.

Sources of information on worm control and the CRACK approach
The people and organizations most commonly asked for advice on worm control (Table 3) were the Department of Agriculture (59 per cent), private veterinarians (15 per cent), stock firms (8 per cent) and veterinary and agricultural consultants (5 per cent). The main source of information on the CRACK approach was the Department of Agriculture (58 per cent) and private veterinarians (23 per cent).

Newspapers, magazines and Department of Agriculture Farmnotes were given as the most likely sources of information on control of internal parasites and the CRACK approach. Table 4 shows other sources of information.

Only 28 per cent of the farmers interviewed had been to a seminar or field day on worm control.
control during the past three years. Most of these information days were organized by the Department of Agriculture. Drug company representatives and agricultural and veterinary consultants also occasionally organized sessions on worm control.

Conclusions

Internal parasites of sheep are the most important animal health problem in Western Australia. The development of drench resistance has the potential to depress sheep and wool production severely, especially in the high and medium rainfall zones. Farmers in the low rainfall areas where internal parasites are of little significance should be excluded from the target audience for the CRACK campaign as the information has little relevance to them.

Most Australian states promote approaches to worm control which are based on the results of scientific investigations. Programmes such as Wormcheck (South Australia), Weaner Watch (Tasmania), Wormplan (Victoria), Drenchplan (New South Wales) and CRACK (Western Australia) encourage the application of basic principles of internal parasite control to individual farms. These approaches should be maintained.

The Western Australian survey showed that some aspects of the CRACK approach had low awareness and adoption rates among farmers. The mnemonic symbols first “C”, “A” and to a lesser extent “K”, and the use of worm egg counts to enhance the adoption of “R”, need special attention. Farmers need to be convinced that taking worm egg counts and testing for resistance should be done annually rather than when a problem arises. The adverse economic consequences of the latter approach need to be emphasized, particularly to farmers in the high and medium rainfall zones.

Awareness of the “R” and second “C” symbols of the CRACK approach was high and indicates that these aspects require less attention.

Many farmers seek information about parasite control from stock firm and drug company representatives. However the survey showed that these representatives were minor sources of information on the CRACK approach. The role of private veterinarians and consultants as providers of services and advice on worm control needs to be encouraged. These groups need continued support and technical information.

Despite the emphasis on seminars and field days for promoting the CRACK approach, only 28 per cent of farmers surveyed had attended such a field day, and many of these farmers had probably attended several similar field days. CRACK information sessions need to be made more attractive to the large number of farmers (76 per cent of those surveyed) who have never attended a field day on worm control in sheep. Alternatively, other means of extension should be considered. A farmer’s sources of information on internal parasite control should be targeted. These include newspapers, magazines and Department of Agriculture publications (Farmnotes, Agricultural Memos and pamphlets). Less reliance should be placed on the annual posting of CRACK pamphlets as these have not been successful as an information source.

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References


